Title: Go Fly a Kite

Brief Overview:

The students will identify symmetrical shapes and objects, and the students will draw lines of symmetry with the use of pattern blocks. In the final lesson, students will build on their knowledge of symmetry in order to construct a symmetrical kite.

NCTM Content Standard:

Geometry

- Use symmetry to analyze mathematical situations
- Use visualization, spatial reasoning, and geometric modeling to solve problems

Grade/Level:

Grades 2-3

Duration/Length:

Three days (Fifty minutes each day)

Student Outcomes:

Students will:

- Identify shapes having one or more lines of symmetry
- Identify that some shapes are asymmetrical
- Draw lines of symmetry
- Construct a symmetrical kite design

Materials and Resources:

- Large visual shapes (big enough to display on the chalkboard)
  Heart, Isosceles Triangle, Circle, Trapezoid
  Scalene Triangle, Curved Arrow
- Let's Fly a Kite by Stuart J. Murphy
- Various objects from around the classroom (book, flag,etc)
- Pattern Blocks
- Tooth Picks
- Math Journals
- Overhead Machine
- Set of hand mirrors
- Rulers, Crayons

Development/Procedures:
Lesson 1

Preassessment - Students will explore the concept of symmetry by examining several large visual shapes that exhibit one line of symmetry and a few objects that are asymmetrical (see *1st bullet in Materials*.) The teacher will ask students to classify the shapes by sorting them on the chalkboard. (The teacher should not give any specific directions for sorting.)

Launch - Read the story Let's Fly a Kite by Stuart J. Murphy to introduce students to symmetry. While reading the story aloud, the teacher needs to discuss with children the meaning of symmetry and what a symmetrical shape (or kite) looks likes. Students need to look for examples of symmetry in the pictures.

Teacher Facilitation - The teacher will go back to the shapes that were previously sorted on the chalkboard. With a large piece of string, the teacher will demonstrate the symmetry by holding the string directly in the middle of the shapes and showing that both sides are exactly the same. For the asymmetrical shapes, the teacher will ask students to explain how the shapes are not the same on both sides.

With students' input, the shapes will be resorted into two groups, shapes that have symmetry and shapes that do not.

Student Application - Distribute *Symmetry or Not*? (Student Resource 1) to students. Students will work with partners to complete the activity. Students may use the large visual shapes and pieces of string to determine the line of symmetry.

Embedded Assessment - Students will play the *Symmetry Game*. The teacher will hold up a large object from around the classroom (a book, a piece of paper, a chart, the flag, a sweater, etc) and students will correctly identify if the object has symmetry or not by making a straight line with their arms for yes and crossing their arms for no.

Reteaching/Extension - Students that are having difficulty with the concept will need to review with the teacher in a small group. The teacher will take the large shapes from the chalkboard. Teacher and students will fold all the shapes in half and compare the two sides. Students will see that symmetrical shapes are exactly the same on both sides and the asymmetrical shapes are different.

The Extension activity is for students to examine the capital letters in the alphabet and determine which letters have symmetry.

Lesson 2

Preassessment - Students will examine several pattern blocks that have more than one line of symmetry (square, diamond, hexagon, and equilateral triangle.) They will be given pattern block graph paper (SR 2) and directed to trace each shape onto the graph paper. Then, students are to use a ruler to draw a line of symmetry.

Launch - The teacher will reread the story Let's Fly a Kite by Stuart J. Murphy. This time, the teacher will instruct students to look for shapes that have more than one line of symmetry.

Teacher Facilitation - Students working in pairs will use toothpicks to find the other lines of symmetry on the pattern blocks. Students will explore rotating the shapes to find the other lines. After exploration, a few students will explain the shapes that have more than one line of symmetry to the class.

Student Application - Distribute a new sheet of pattern block graph paper and a trapezoid pattern block to each pair of students. Then, direct students to trace each shape and draw at least two lines of symmetry (more if they can) on each traced shape.

Embedded Assessment - For each of the traced shapes, students need to make an independent journal entry describing the symmetry of the shape. For example, the student might write about the square as having four lines of symmetry- from side to side, the other side to side, and then from corner to corner and the other corner to corner. Students can draw the shape in their journal to give a better explanation.

Students might be confused by the trapezoid because it only has one line of symmetry.

This possible confusion will give the teacher insight into reteaching the concept.

Reteaching/Extension - The teacher will work with students that are having difficulty finding two lines of symmetry. These students might benefit from seeing the symmetry in another way. The teacher will model how to use a hand mirror to find a line of symmetry on the first shape (SR3.) For each shape, the students will hold the mirror to find and trace a line of symmetry. To find another line of symmetry, students will rotate their mirrors and then find another place where the image in the mirror is exactly the same as the half on the paper.

The extension activity is for students to examine an oval and a circle. In their Math Journals, they will compare the number of lines of symmetry for each shape.

Lesson 3

Preassessment - Students will use the *Kite Practice Sheet (SR4)* to draw two lines of symmetry.

Launch - The teacher will reread the story Let's Fly a Kite by Stuart J. Murphy, this time emphasizing the fact that students will need to think of a symmetrical design for their own kites.

Teacher Facilitation - Students will be given time to explore and design their own symmetrical patterns using the blocks on their *Kite Practice Sheets.* The teacher discusses the fact that the two sides of the kite must be exactly the same. For instance, if you trace a triangle and a trapezoid on one side, you must trace the exact same triangle and trapezoid in the exact same place on the other side.

Student Application - The students will trace their designs onto the *Kite Practice Sheet.* Students will add color and decoration to their final kites.

Embedded Assessment - Students will use their kites to write a short paragraph explaining why their kite design is symmetrical (SR 5).

Reteaching/Extension - Students that are having difficulty creating their own symmetrical designs will work with the teacher to complete the Pattern Block Puzzle (SR 6.) Using the pattern blocks, students will model the given design and then trace it exactly on the other side of the line of symmetry. The teacher will monitor to ensure that students are tracing the blocks exactly across the line of symmetry.

The extension activity is for students to complete the Pattern Block Puzzle on their own.

Summative Assessment:

The students will complete the *Assessment Activity (SR 7).* They will apply their knowledge of symmetrical shapes in order to complete the selected response questions and the brief constructed response.

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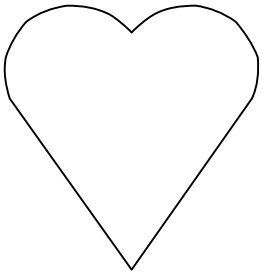
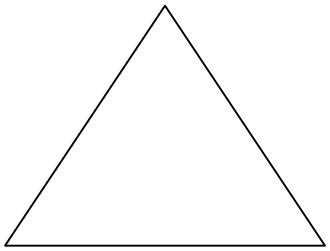
Symmetry or Not?
Name_____Date_____

Write yes if the shape has symmetry.
Write no if the shape does not have symmetry.
You may use a piece of string to help you.

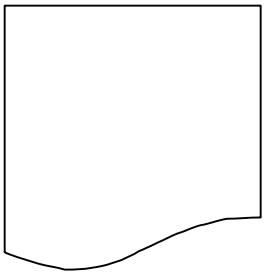
1.__yes___



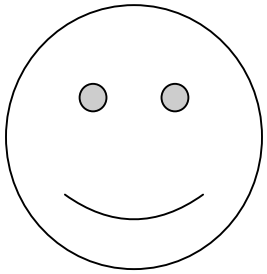
2.__yes___



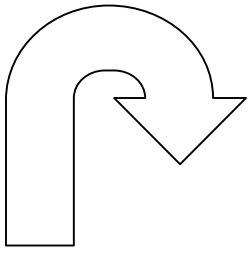
3.___no___



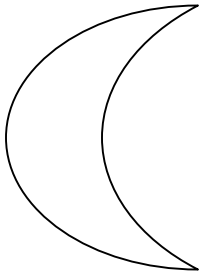
4.___yes___



5. ___no___



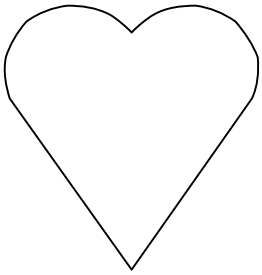
6.___yes___



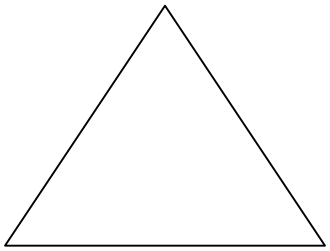
Symmetry or Not?
Name_____Date_____

Write yes if the shape has symmetry.
Write no if the shape does not have symmetry.
You may use a piece of string to help you.

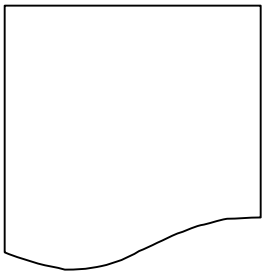
1._____



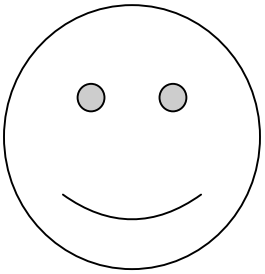
2._____



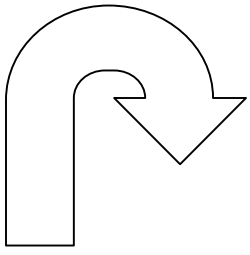
3._____



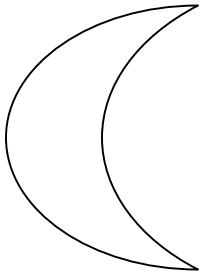
4._____



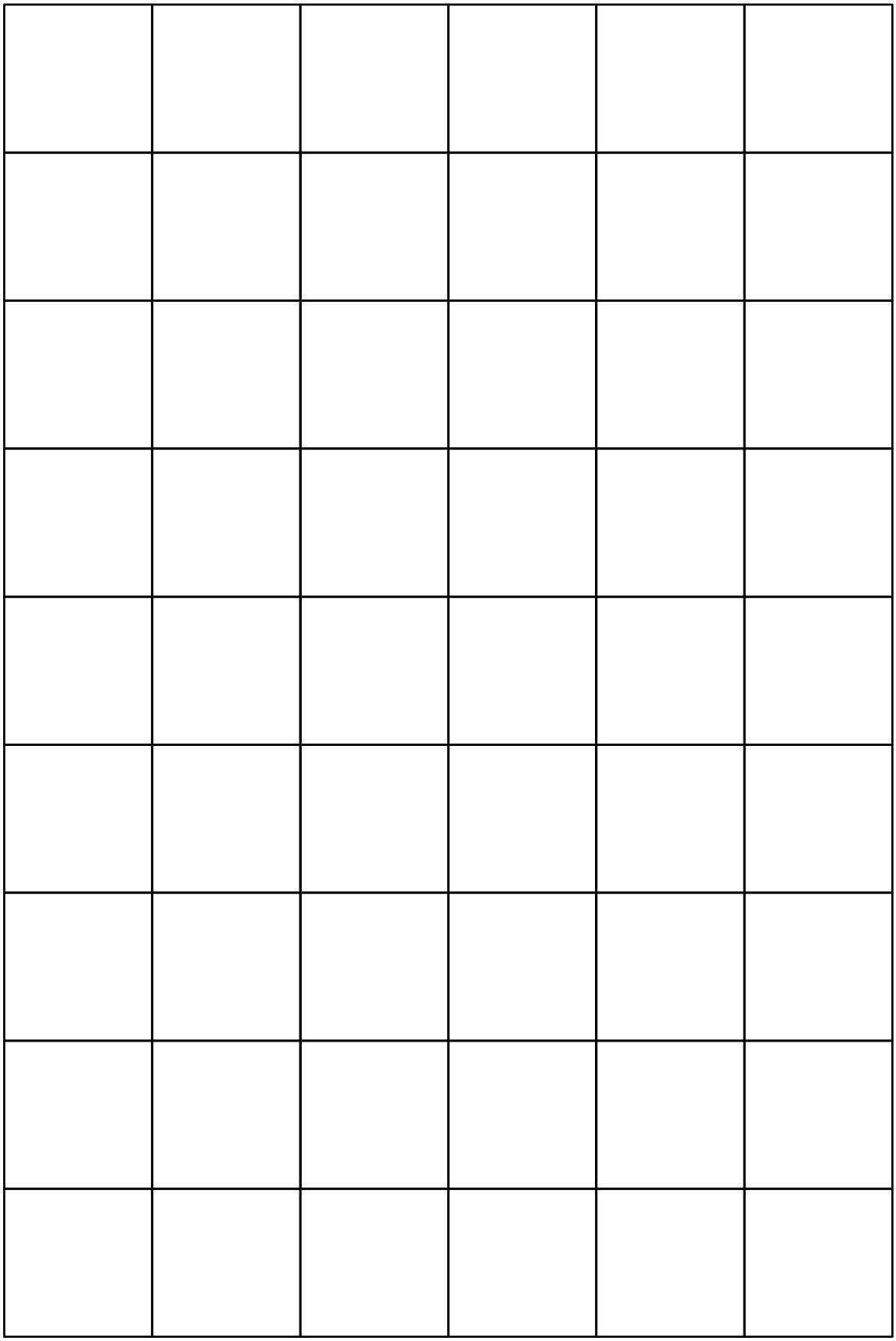
5. _____



6._____

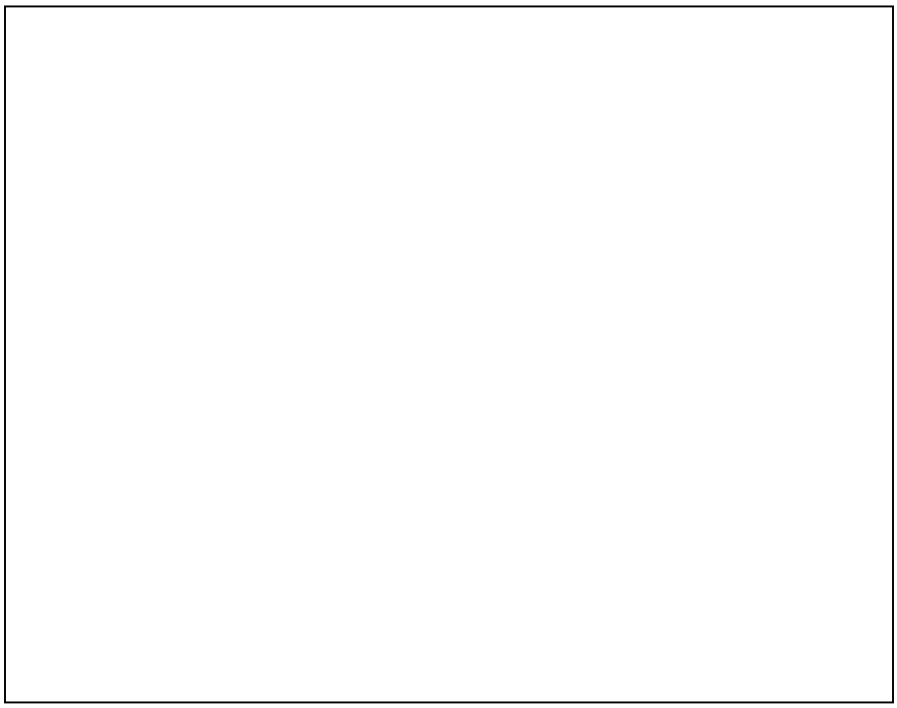


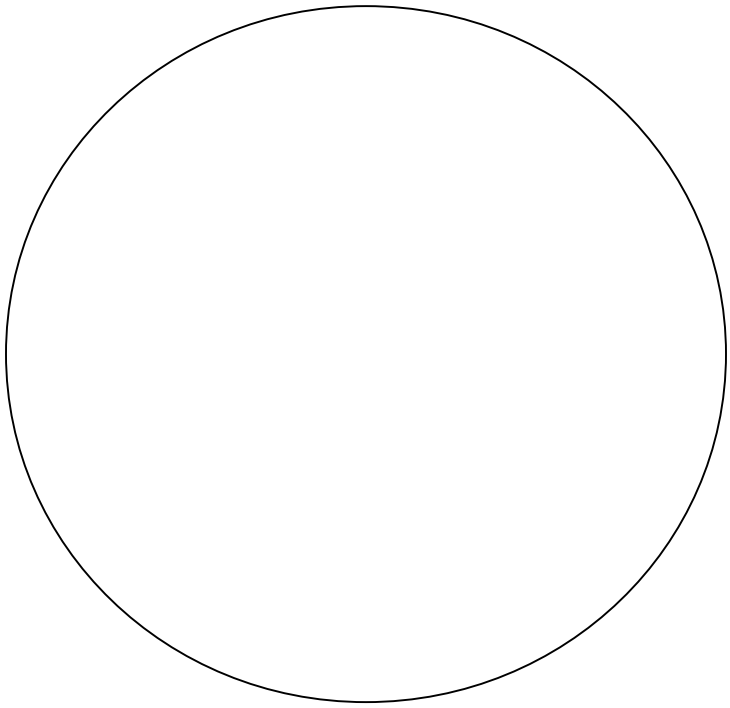
Pattern Block Graph Paper
Name_____Date_____

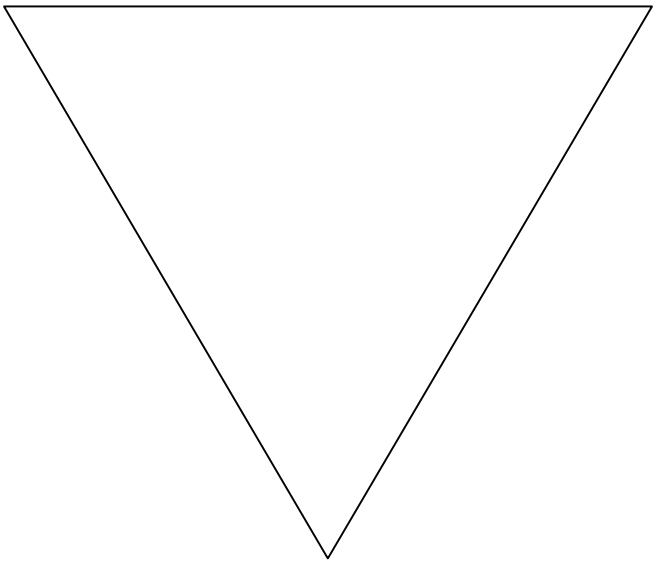


Mirror Shapes

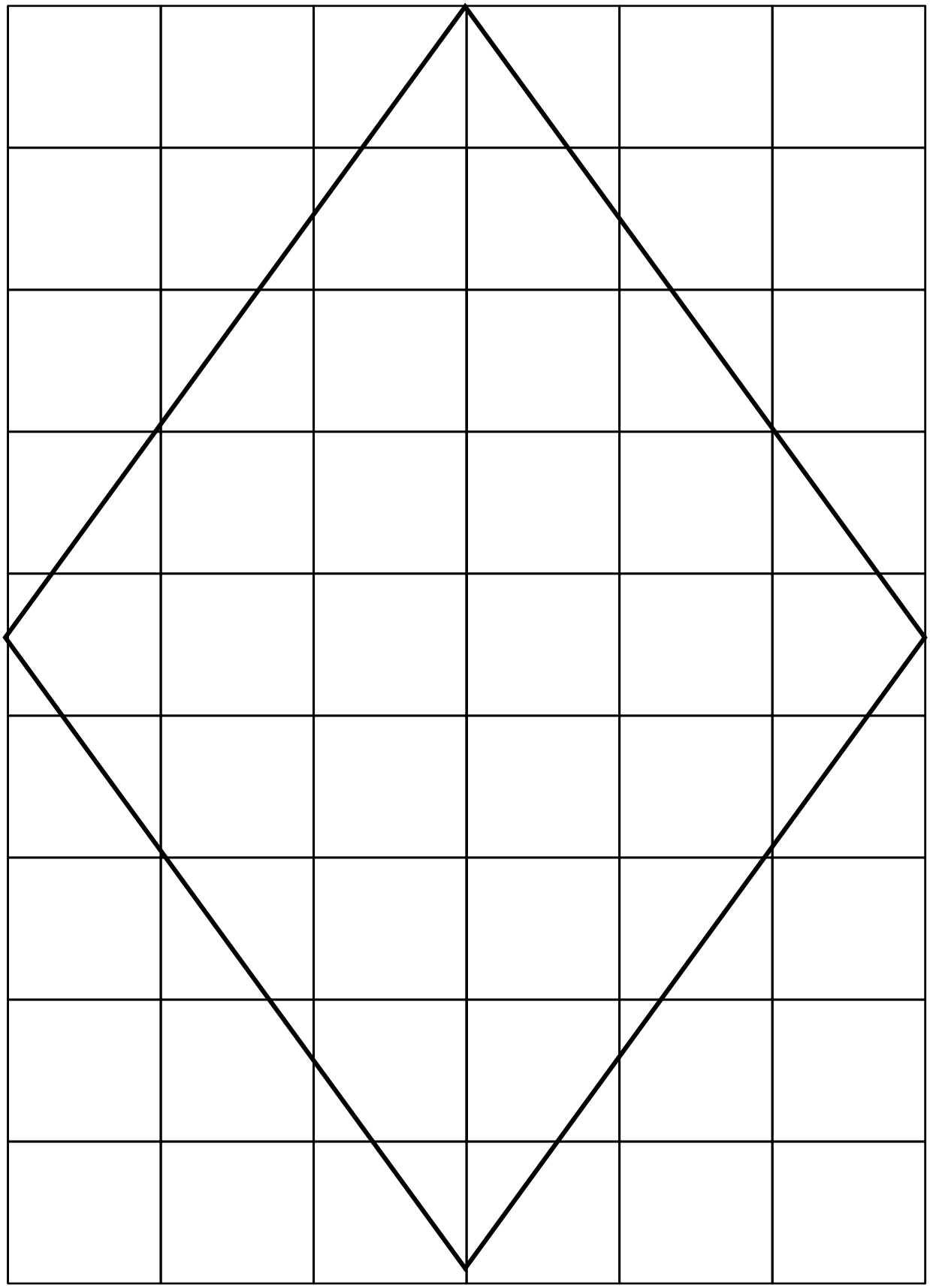
Name_____Date_____







Kite Practice Sheet



Name_____Date_____

In a short paragraph, explain why your kite design is symmetrical.

Sample Answer

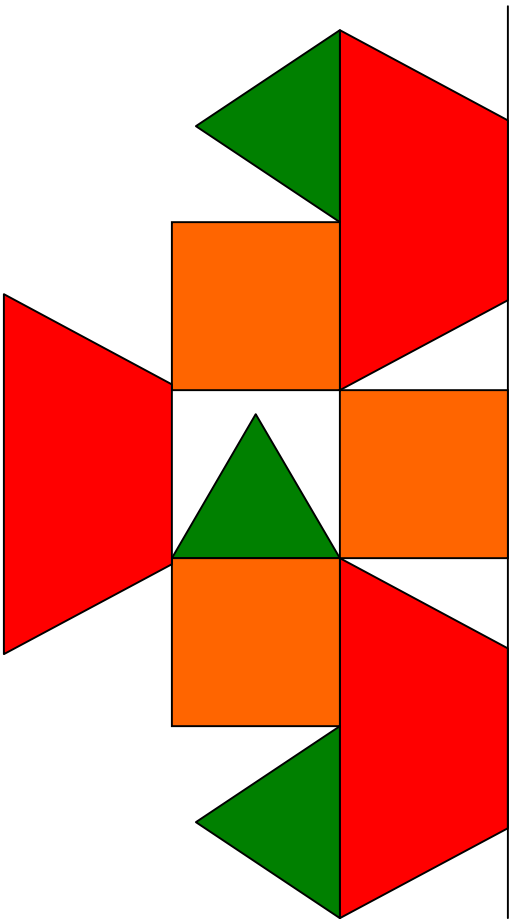
My kite design is symmetrical because it is exactly the same on both sides. The line of symmetry is in the middle. I drew 2 squares on the left side and then I drew the 2 squares on the right side in the same place. All of the shapes are exactly the same on both sides.

Name_____Date_____

In a short paragraph, explain why your kite design is symmetrical.

Pattern Block Puzzle

Name_____Date_____



Name_____Date_____

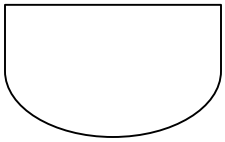
1. A line of symmetry is drawn

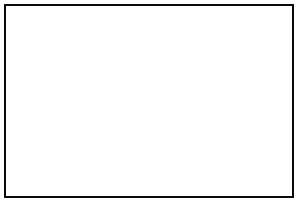
a. from the middle of the shape to the edge
b. from the edge of the shape to make two new pieces
c. across the top of the shape
*d. across the middle of the shape to make two equal parts

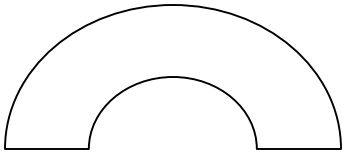
2. Which shape has more than two lines of symmetry?

a. heart
b. trapezoid
*c. circle
d. scalene triangle

Use what you have learned to choose one shape that has more than one line of symmetry. Draw the lines with a ruler.







Explain why the shape you chose has at least two lines of symmetry. Sample Answer

I chose the rectangle. It has a bunch of lines of symmetry. You can draw from the middle of one side to the middle of the other side to make two equal parts. Next, you can draw from one corner to the corner across from it, making two equal parts. A line of symmetry cuts the shape in half.

Name_____Date_____

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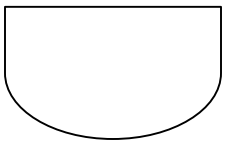

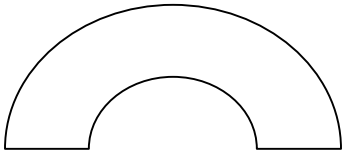

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